Keeping a lab notebook

OITE Bootcamp 2011

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Why keep a lab notebook

- Keep a record of experiments and experimental setup
  - Written records are useful in many settings besides wetlabs.
- To be able to accurately reproduce experiments months or years later
- Allow others to reproduce your experiments
- Aid in trouble-shooting failed experiments
- Primary source for writing the methods for a scientific poster or paper

Types of notebooks: Bound

- Pages are bound or sewn together
- Advantages
  - Portable
  - Inexpensive
  - Pages won't get lost or out of order
  - Can tape in data sheets
- Disadvantages
  - Not easily searchable
  - Can't reorder pages
  - Difficult to copy
  - Requires legible hand-writing

Types of notebooks:Loose-leaf

- Three-ring binder
- Advantages
  - Portable
  - Can insert other experimental data sheets (computer printouts)
- Disadvantages
  - Not easily searchable
  - Requires legible hand-writing
  - Pages may fall out or get out of order

Types of notebooks:Electronic

- Computer program or computer record
- Advantages
  - Searchable
  - Can be easily backed up and duplicated
  - Can be linked with any electronic data
- Disadvantages
  - Requires a laptop for portability
  - Need to learn new computer software
  - Theft, damage or file corruption

Many labs already have standard notebooks, it is best to follow the lab standard

Types of Pens

- Make sure the lab pen you use is fairly resistant to spills
- Do not use pencil
- Avoid sharpies- they can easily bleed through pages, making multiple entries illegible

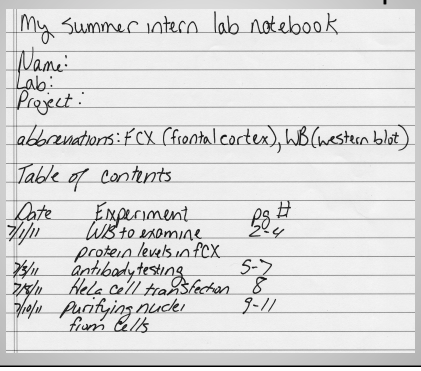
	Abuse treatment				
Pen	Control	Water	Methanol	Ethanol	Acetone
Bic Accountant fine point (red)	123	123	123	123	123
Bic Accountant fine pt (black)	123	123			
Bic Round Stic med (black)	123	123	123	123	123
Cross fountain pen (blue/black)	123	123	123	123	123
Dixon Ticonderoga 1388-2 soft pencil	123	123	123	123	123
Pentel Hybrid Gel Roller (black)	123	123	123	123	123
Pilot G-2 07 (black)	123	123	123	123	123
Sakura Gelly Roll fine (black)	123	123	123	123	123
Sakura Gelly Roll fine (blue)	123	123	123	123	123
Sakura Gelly Roll XPGB (blue)	123	123	123	123	123
Sanford Uni-Ball Gel RT Med (black)	123	123	123	123	123
Sanford Uni-Ball Vision fine (black)	123	123	123	123	123
Sanford Uni-Ball Vision fine (blue)	123	123	123	123	123
Sanford Uni-Gel RT fine (blue)	123	123	123	123	123

Image from http://www.swarthmore.edu/NatSci/cpurrin1/notebookadvice.htm

Front section of notebook

- Your name, lab, project
- Any abbreviations and special notes
  - Sample labeling conventions
- Table of contents
  - Date
  - What experiment was completed
  - Page numbers

Notebook front section example


My Summer intern lab notebook

Name:
Lab:
Project:

abbreviations: FCX (frontal cortex), WB (western blot)

Table of contents

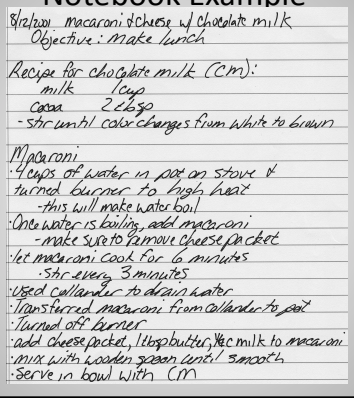
Date	Experiment	pg #
7/1/11	WB to examine protein levels in FCX	2-4
7/5/11	antibody testing	5-7
7/8/11	HeLa cell transfection	8
7/10/11	purifying nuclei from cells	9-11

Notebook entry organization

- **Headings:** Date, title of experiment
- **Body:** All steps of experimental protocol (including deviations from prescribed protocol) Buffer compositions, any observations
- **Closing:** Results (include pictures if possible)
- If your notebook doesn't have numbered pages, number them

Notebook entries are not unlike cooking recipes

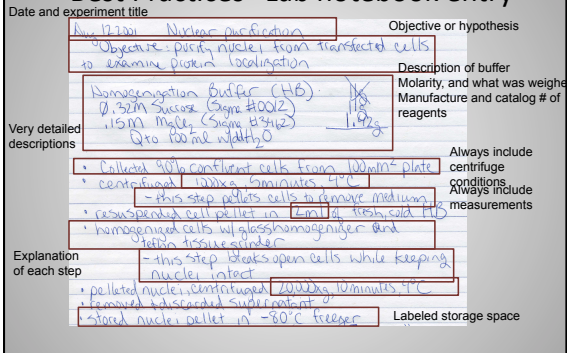
Notebook Example


8/2/2011 macaroni & cheese w/ chocolate milk
Objective: make lunch

Recipe for chocolate milk (CM):
milk 1 cup
cocoa 2 tbsp
- stir until color changes from white to brown

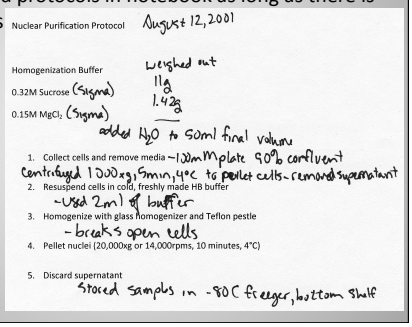
Macaroni
- 4 cups of water in pot on stove & turned burner to high heat
  - this will make water boil
- Once water is boiling, add macaroni
  - make sure to remove cheese packet
- let macaroni cook for 6 minutes
  - stir every 3 minutes
- used Callander to drain water
- Transferred macaroni from callander to pot
- Turned off burner
- add cheese packet, 1 tbsp butter, ½ c milk to macaroni
- mix with wooden spoon until smooth
- Serve in bowl with CM

"Best Practices" Lab notebook entry



Make use of prewritten protocols

- Plan each experiment out before beginning
- Can tape typed protocols in notebook as long as there is room for edits

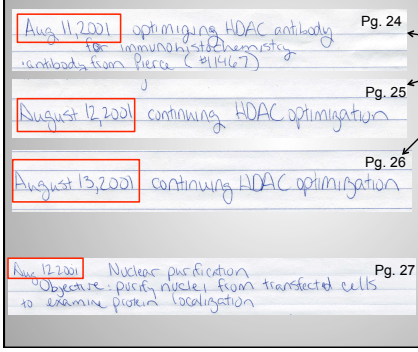

Nuclear Purification Protocol August 12, 2001

Homogenization Buffer — Weighed out
0.32M Sucrose (Sigma) 11g
0.15M $MgCl_2$ (Sigma) 1.4g
added H_2O to 50ml final volume

1. Collect cells and remove media ~100ml plate 90% confluent
   Centrifuged 1000xg, 5min, 4°C to pellet cells - removed supernatant
2. Resuspend in cold, freshly made HB buffer
   - Used 2ml of buffer
3. Homogenize with glass homogenizer and Teflon pestle
   - breaks open cells
4. Pellet nuclei (20,000xg or 14,000rpms, 10 minutes, 4°C)
5. Discard supernatant

Stored samples in -80C freezer, bottom shelf

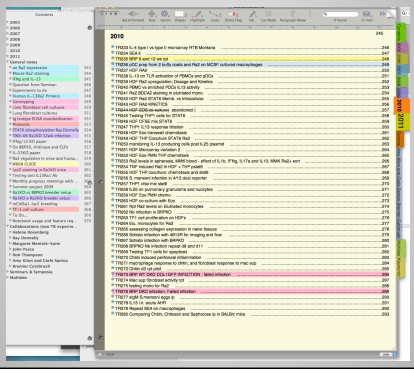
Organize by experiment, not date

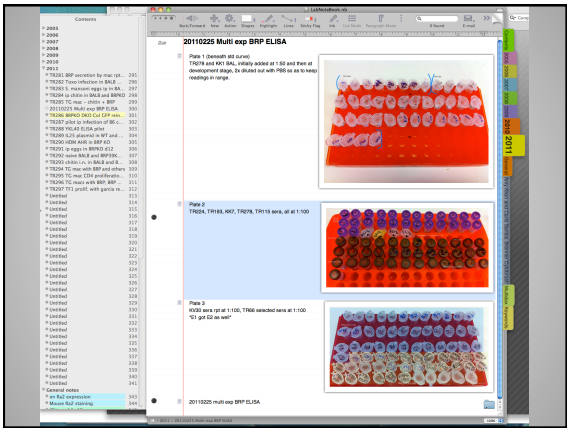


Multi-day experiment, kept on sequential notebook pages

Different experiment started during this time
New notebook page started with room to finish previous experiment
It's OK to have blank pages in your notebook

Organize by experiment, electronically





Critique this lab notebook entry

Aug 12, 2001 Nuclear Purification

Homogenization Buffer: @.32M Sucrose, 15M $MgCl_2$, 10ml H_2O

- collected 90% confluent cells
- Centrifuged 5 minutes
- resuspended cells in cold HB
- homogenized cells
- pelleted in centrifuge - 10minutes
- Stored in freezer

Lab books can be used in multiple settings

- Notebooks are not just for wet-lab.
- Clinical work, patient interviews. Need detailed records of any patient interaction
- For computer work, use notebooks to record software versions, command series, databases used
- For animal work, use notebooks to record room temperatures, starting and ending times, injection times, habituation times, any outside interference

Final tips

- Your notebook should be readable, but don't worry about appearance outside of that. It will get spilled on. That is OK
- Always keep your notebook with you in the lab. Update it as soon as possible. Good times to update are:
  - washing and incubation periods
  - at the beginning and end of the day
- This should be an accurate record of your work, don't try and rely on memory to recreate your experiments
- BACK UP DATA! Speak with co-workers/IT staff if necessary.